

CLAIMS

What is claimed is:

1. A parser program to parse mathematical optimization problems, wherein a geometric program is converted from a set of algebraic expressions to a compact numeric format that can be accepted by a computer-based geometric program solver.
2. The parser of claim 1, wherein said geometric program is comprised of an objective and a set of one or more constraints.
3. The parser in claim 2, wherein:
  - said objective includes an expression of one or more mathematical terms; and
  - each constraint in said set includes either an inequality or equality of one or more mathematical terms.
4. The parser in claim 3, wherein:
  - each mathematical term includes one or more optimization variables.
5. A computer-implemented method of parsing a mathematical optimization problem comprising:
  - reading a plurality of algebraic expressions that represent a mathematical optimization problem, each algebraic expression in said plurality having one or more mathematical terms;
  - creating a set of signomial expressions by converting each of said mathematical terms to a signomial; and

7 converting said set of signomial expressions to a compact numeric format to be accepted  
8 by a computer-based geometric program solver.

1 6. The method of Claim 5, wherein said algebraic expressions include an objective and a set  
2 of one or more constraints.

1 7. The method in claim 6, wherein:  
2 said objective includes an expression of one or more mathematical terms; and  
3 each constraint in said set includes either an inequality or equality of one or more  
4 mathematical terms.

1 8. The method in claim 7, wherein:  
2 each mathematical term includes one or more optimization variables.

1 9. The method of Claim 5, further comprising:  
2 prior to said converting, determining that all signomial expressions in said set reduce to  
3 either a posynomial objective, a posynomial inequality or a monomial inequality;  
4 after said determining, identifying that said mathematical optimization problem is a  
5 geometric program.

1 10. The method of Claim 5, further comprising:  
2 prior to said converting, determining that at least one of said signomial expressions in  
3 said set cannot be reduced to either a posynomial objective, a posynomial inequality or a  
4 monomial inequality;

5 after said determining, reporting to a user which of said signomial expressions in said set  
6 cannot be reduced to either a posynomial objective, a posynomial inequality or a monomial  
7 inequality.

1 11. The method of Claim 10, further comprising the step of:  
2 simplifying each signomial expression in said set by mathematically canceling a  
3 combination of a plurality of said signomials.

1 12. A computer-implemented method of parsing a mathematical optimization problem  
2 comprising:  
3 reading a plurality of algebraic expressions that represent a mathematical optimization  
4 problem, each algebraic expression in said plurality having one or more mathematical terms;  
5 identifying that said algebraic expressions form a geometric program; and  
6 converting said plurality of algebraic expressions to a compact numeric format to be  
7 accepted by a computer-aided geometric program solver.

1 13. The method of Claim 12, wherein said algebraic expressions include an objective and a  
2 set of one or more constraints.

1 14. The method in claim 13 wherein:  
2 said objective includes an expression of one or more mathematical terms; and  
3 each constraint in said set includes either an inequality or equality of one or more  
4 mathematical terms.

1 15. The method in claim 14, wherein:

2 each mathematical term includes one or more optimization variables.

1 16. The method of claim 12, further comprising:

2 prior to said identifying, creating a set of signomial expressions by converting each of

3 said mathematical terms to a signomial; and

4 after said creating, determining that all signomial expressions in said set reduce to either

5 a posynomial objective, a posynomial inequality or a monomial inequality.

1 17. The method of Claim 16, further comprising:

2 prior to said identifying, determining for each algebraic expression in said plurality that a

3 mathematical combination of said mathematical terms form either a posynomial objective, a

4 posynomial inequality or a monomial inequality.

1 18. A computer-readable medium for parsing a geometric program comprising:

2 a user interface to accept a plurality of algebraic expressions that represent a

3 mathematical optimization problem, each algebraic expression in said plurality having one or

4 more mathematical terms;

5 an expression verifier coupled to said user interface to identify that said algebraic

6 expressions form a geometric program; and

7 a matrix generator coupled to said to expression verifier to convert said plurality of

8 algebraic expressions to a compact numeric format to be accepted by a computer-aided

9 geometric program solver.

1 19. The computer-readable medium of Claim 18, wherein said algebraic expressions include  
2 an objective and a set of one or more constraints.

1 20. The computer-readable medium in claim 19, wherein:  
2 said objective includes an expression of one or more mathematical terms; and  
3 each constraint in said set includes either an inequality or equality of one or more  
4 mathematical terms.

1 21. The computer-readable medium in claim 20, wherein:  
2 each mathematical term includes one or more optimization variables.

1 22. The computer-readable medium of Claim 18, further comprising:  
an expression reducer to simplify each algebraic expression of said plurality by  
mathematically canceling a combination of a plurality of said mathematical terms.